



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

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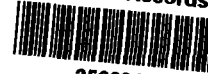
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REPLY TO THE ATTENTION OF

December 13, 1994

Norman W. Bernstein
N.W. Bernstein & Associates
2000 M Street, N.W.
Suite 745
Washington, D.C. 20036

EPA Region 5 Records Ctr.



256684

Dear Norm:

Enclosed you will find the information mentioned in my 12/9 letter to you regarding capping the excavated southern area.

As was mentioned in our last meeting, EPA proposes this criteria to be used to compare exit sample results with. The necessity for extending the Subtitle C cap over this southern area is to be based on the results of the exit sampling, which are to be compared against proposed cleanup criteria. EPA proposed using RCRA clean closure criteria, which are enclosed. If the exit sample results indicate that samples are contaminated above this cleanup criteria, then the cap would extend over the area.

I look forward to receiving your proposal and anticipate swift resolution of this issue. Once I receive your proposal, I will contact you so appropriate dialogue on this issue can occur promptly.

If you have any questions, please call me.

Sincerely yours,

Dion Novak
Remedial Project Manager

Enclosure

cc: T. Likins, IDEM
M. Dowiak, AWD
T. Krueger, EPA

HAZARDOUS WASTE MANAGEMENT UNIT CLOSURE GUIDANCE

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF SOLID AND HAZARDOUS WASTE MANAGEMENT

March, 1994

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INTRODUCTION

1. PURPOSE AND DEFINITIONS

This document sets forth the Indiana Department of Environmental Management (IDEM), Office of Solid and Hazardous Waste Management (OSHWM) instructions for the preparation of closure plans to meet the requirements of 329 IAC 3.1.

Definitions

For definitions not specifically listed below, please refer to 329 IAC 3.1 and 40 CFR 260.10.

Clean Closure refers to closure of a hazardous waste management facility or unit(s) that includes the decontamination, treatment, and/or removal of all hazardous waste, hazardous waste constituents, hazardous constituents, leachate, contaminated run-on and run-off, waste decomposition products, liners, and contaminated soils (including groundwater) that pose a substantial present or potential threat to human health or the environment (40 CFR 264.111 and 265.111). Refer to Section 13: Cleanup Levels.

Closure of a hazardous waste (RCRA) facility refers to the action to secure the hazardous waste management facility or unit(s) in a manner that will protect human health and the environment in accordance with the closure plan requirements of 40 CFR 265 Subpart G and 264 Subpart G. The closure plan should indicate that the hazardous waste management facility or unit is to be clean closed or closed in place as a landfill. Also, the closure plan should state verbatim the Closure Performance Standard in 40 CFR 265.111 or 264.111.

Closure in Place refers to leaving contamination in-place after closure when contamination cannot be practicably removed during closure. A facility which closes in-place must, at a minimum, comply with the requirements for capping the hazardous waste management unit, developing and implementing a groundwater monitoring plan, and providing a written post-closure plan subject to the IDEM approval.

Facility means all contiguous land, structures, other appurtenances, and improvements on the land used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units (e.g. one or more landfills, surface impoundments, or combination of them).

A Hazardous Waste Management Unit is a contiguous area of land on or in which hazardous waste is placed, or the largest area in which there is significant likelihood of mixing hazardous waste constituents in the same area. Examples of hazardous waste management units include a container storage area, an incinerator, a land treatment area, a landfill cell, a surface impoundment, a tank and its associated piping and underlying containment system, and a waste pile.

Partial Closure means the closure of a hazardous waste management unit in accordance with the applicable closure requirements of 40 CFR Parts 264 and 265 at a facility that contains other active hazardous waste management units.

Total Closure or Final Closure is defined as closure of all hazardous waste management units at the facility in accordance with the closure requirements of 40 CFR 264 and 265. After closure certification has been accepted, the facility must still comply with all

generator requirements of 40 CFR 262 if waste is to remain on-site for less than ninety (90) days (40 CFR 262.34).

2. CLOSURE REGULATIONS

The IDEM regulates the management of hazardous waste via the Environmental Management Act, IC 13-7 and the Indiana hazardous waste rules, 329 IAC 3.1 et seq. These rules incorporate, by reference, 40 CFR 260 through 270. Closure of hazardous waste facilities under interim status is regulated under 40 CFR 265 Subpart G and 329 IAC 3.1-10 and 14. Closure of facilities that have a Part B Permit is regulated by 40 CFR 264 Subpart G and 329 IAC 3.1-9 and 15. Copies of 329 IAC 3.1 et seq. can be acquired by calling the Legislative Services Agency at 317/232-9581.

Also, please note that any interim status or permitted facility is subject to Corrective Action under the Hazardous and Solid Waste Amendments (HSWA) of 1984. Any facility regulated under HSWA is responsible for releases of hazardous wastes or constituents from any solid waste management unit.

3. AGENCY REVIEW AND PUBLIC NOTICE OF CLOSURE PLANS

When the IDEM receives a closure plan, the closure plan is logged in and assigned to a reviewer. The closure plan will be reviewed for completeness and for technical adequacy. If inadequate in these respects, the owner/operator will be sent a Notice of Deficiency (NOD). The NOD will address inadequacies in the plan. The plan must be revised to address the items in the NOD and resubmitted to the IDEM. When the IDEM receives a complete and technically adequate plan, the IDEM will approve or modify the closure plan in accordance with 40 CFR 265.112 and 40 CFR 264.112. Please see Attachment 1 for a flow chart outlining the closure plan review process.

Initially, two copies (an original and a copy) of the closure plan should be sent to the IDEM. After receiving acknowledgement from the IDEM that the plan is complete, the owner/operator will be requested to send in additional copies for technical review and public notice purposes.

A Public Notice will be filed in a local newspaper and the public will be given the opportunity to submit written comments and request modifications of the plan. A public hearing may be conducted at the IDEM's discretion.

A closure plan certification statement identical to the one in Attachment 3 must be submitted with the closure plan. At least one copy of the certification statement must have original signatures.

CLOSURE PLAN PREPARATION

4. FACILITY DESCRIPTION

A facility description must be provided to include the following:

- a. description of the type of industry,
- b. Standard Industrial Code (SIC),
- c. products,
- d. location,
- e. size,
- f. other permitted activities occurring on-site (i.e. NPDES), and
- g. other general, summarized information.

5. DESCRIPTION OF WASTE MANAGEMENT UNITS TO BE CLOSED

Describe each container storage area, tank system, incinerator, land treatment unit, landfill, surface impoundment, and/or waste pile that is to be closed. For each unit, provide the following:

- a. A discussion of the type of waste management activities which occurred at the unit(s). Indicate the capacity and the maximum inventory of the unit(s). Include the process code and unit of measure from the Part A Permit Application, if applicable.
- b. Descriptions of each waste found in the unit(s). This should include common name and U. S. EPA hazardous waste code.
- c. A discussion of the time period of use, dimensions, capacity, topography, soil types (as appropriate), copies of past spill reports, and any other relevant information for the unit(s).
- d. A copy of the most recent Part A Permit Application, if applicable.

Plans for total closure must address all units at the facility. Plans for partial closure should indicate which units are to remain active. This should also be indicated on the facility Part A Application.

The closure plan should state verbatim the Closure Performance Standard in 40 CFR 265.111 or 264.111.

6. MAPS AND DRAWINGS

A topographic or county map should be provided indicating the location of the facility without obscuring the features of the site. The topographic or county map should include features within 1,000 feet of each property line of the facility. Detailed map(s) or diagram(s) of the facility itself, detailed drawing(s) of each unit to be closed, as well as cross sectional drawing(s) of secondary containment systems, landfills, and/or surface impoundments should also be provided. Topographic features, well locations, surface water run-on/run-off directions should be discussed and/or included on the detailed map(s), drawing(s) and diagram(s).

a. Detailed map(s) or diagram(s) of the facility itself should also include, but not be limited to:

1. Map scale and date,
2. Orientation of the map (north arrow),
3. Legal boundaries of the facility,
4. Access control (fences, gates),
5. Surrounding land uses (residential, commercial, agricultural, recreational),
6. Building(s), structure(s) on-site including entrances/exits of each,
7. Location(s) of each hazardous waste management unit on-site including clear identification of unit(s) undergoing closure.
8. The United States Department of Agriculture, (USDA) Soil Conservation Service, (SCS) Soils Survey Map of the area surrounding the unit.

b. Detailed drawing(s) of each unit to be closed should also include, but not be limited to:

1. Drawing scale and date,
2. Orientation of the drawing (north arrow),
3. Dimensions, entrances/exits of building(s) or structure(s) located adjacent to unit undergoing closure,
4. Dimensions of unit(s) undergoing closure,
5. Appurtenant structures or equipment of unit(s) undergoing closure,
6. Relationship of unit(s) undergoing closure to other points or structures on the facility property.

Additional maps and/or drawings may be requested in Section 14a, Soil Sampling Requirements, depending upon the applicability of soil investigation.

7. CONTAINMENT DESCRIPTION

Provide a detailed description of the containment of the unit(s) undergoing closure. Describe how the unit, including the containment, has been designed and operated to prevent the migration or escape of hazardous waste, hazardous constituents, leachate, and/or run-off from the unit.

For container and tank storage units and incinerators, the discussion should focus on the features of the secondary containment structure (walls, berms, slope), if any. This applies to the entire unit, including ancillary equipment, if applicable. It should include items such as capacity, dimensions, age, and integrity. Include details such as materials of construction, joints, fittings, coatings or sealants applied to the structure, and chemical resistant water stops used at joints.

For waste piles, landfills, surface impoundments, and land treatment units, the description should provide information on the liner and the cover system, if present. The information should include the following:

- liner type, composition, manufacturer, dimensions, thickness, and age,
- a brief description of the original liner installation procedure, including seaming and QA/QC checks, and
- a brief description of any liner maintenance and inspection performed after installation.

Provide a description of the structural condition of the unit including cracks, tears, leaks, punctures, holes, or unsealed joints or seams of the secondary containment system, liner, or cover system, where applicable.

If containment structures are not present or are inadequate, describe the drainage features of the unit and its surroundings, and identify where spilled waste would flow. This should include a discussion of the setting of the facility, including attenuative properties of the soil between the unit, groundwater and surface water and any other factors that would influence the mobility of hazardous waste or hazardous waste constituents and the potential for it to migrate and impact groundwater or surface water.

8. HAZARDOUS WASTE LIST

The facility must provide a complete, detailed list of all hazardous wastes (chemical name and the U.S. EPA hazardous waste number) treated, stored, or disposed of at each unit. Common names or trade names should not be used when generic chemical names are available. For each unit, provide the total volume or weight of each hazardous waste managed on-site over the active life of the facility.

9. AIR EMISSIONS

When applicable, the plan should specify how the owner/operator will minimize or eliminate air emissions related to closure, including nuisance problems such as dust or odors. Examples include solvent emissions during remediation, transfers, or decontamination operations and dust problems related to decontamination, soil excavation, or solidification.

10. PERSONNEL SAFETY AND FIRE PREVENTION

The closure plan should indicate that OSHA and other governmental regulations will be followed to protect all personnel (including contractors and visitors) involved in the closure or people possibly exposed to hazardous waste by the closure activity.

11. CLOSURE SCHEDULE

Rule 40 CFR 264.113(a) and 265.113(a) require the owner/operator to treat, remove, or dispose of all hazardous waste in accordance with the approved closure plan within ninety (90) days after approval of the closure plan by the IDEM or after receiving the final volume of hazardous wastes for permitted facilities. A longer period may be requested (refer to 40 CFR 264.113 and 265.113).

Also, 40 CFR 264.113(b) and 265.113(b) state the owner/operator must complete closure activities in accordance with the approved closure plan and within one hundred eighty (180) days after approval of the closure plan or one hundred eighty days after receiving the final volume of wastes.

The plan should contain a timetable that shows all critical dates for closure, including waste removal, sampling, soil removal, critical points when the independent engineer or his representative will be present, restoration of the site, survey plat (if applicable), independent engineer's certification, and other relevant activities. This timetable should

generally start at the point of closure plan approval or some other definable date, and the timetable should not rely on calendar dates.

The IDEM may require that the owner/operator contact the OSHWM in advance of certain critical activities, such as soil sampling or soil removal, groundwater monitoring well installation or well sampling, to allow an inspector to be present to observe these activities.

Closure time periods longer than those listed above may be granted if detailed justification is provided that meets the requirements of 40 CFR 264.113(c) or 265.113(c). For extensions of the closure period, refer to 40 CFR 264.113(d) and 265.112 which reference the permit modifications of 40 CFR 270.42. It should be noted that a closure time period for achieving clean closure should not exceed three (3) years. If clean closure cannot be achieved, a post-closure plan must be submitted for approval. Closure certification is due sixty (60) days after closure is complete.

12. DECONTAMINATION OF TANKS, EQUIPMENT, AND STRUCTURES

The owner/operator should describe all efforts to remove hazardous waste, its residues, and hazardous waste constituents from tanks, or decontaminate paved areas, containment systems, equipment, structures, pipes, pumps, sumps, and any other appurtenances to the hazardous waste management unit in accordance with 40 CFR 264.114 and 265.114. The owner/operator may be requested to use any reasonable means to clean or decontaminate the unit and its ancillary equipment, including scraping, pressure washing, solvent washing, and other means of cleaning.

Containment Structures

Before decontamination, all paved areas, containment systems, structures, and sumps shall be visually inspected to identify any cracks, gaps, spills, stains, or damaged areas which may be present. This visual inspection should be documented in the Closure Certification with notations of any identified problems. Any cracks, gaps, or damaged areas should be repaired by grouting or sealing by other means before decontamination is performed in order to prevent further release of contamination into the underlying soils.

Decontamination of paved areas, containment systems, and sumps should include:

- removing the waste;
- mechanical cleaning (scraping or sweeping);
- visual inspection;
- repair of damaged or unsealed areas;
- low volume, high pressure washing (may include steam or detergent for more effective cleaning);
- three successive, low pressure, ambient temperature water rinses; and
- sampling and analysis of the final rinse for confirmation.

The first two water rinses, as described above, should serve to remove both the residual wastes and any detergents used during the washing phase. The third or final rinse will provide the source of the verification samples. Verification of decontamination must be provided to confirm that cleanup levels have been met. At least two samples of the final rinse from each unit undergoing closure should be analyzed for those hazardous constituents (as defined in 40 CFR 261, Appendix VIII) identified in the waste, or hazardous waste constituents (as defined in 40 CFR 260.10). Section 13 describes the

cleanup levels for the rinsate which should be achieved, at a minimum by the facility to achieve clean closure. Decontamination procedures will be repeated until the cleanup levels are met.

Tanks and Appurtenances

Tanks containing hazardous waste must be subjected to all reasonable means of decontamination in order to meet the cleanup levels. The procedures for decontamination include manual sludge removal, pressure or solvent washes, rinses, and other procedures. An independent registered professional engineer should certify the methods used and that the level of decontamination is appropriate for the tanks final disposition (for example, disposal as a hazardous waste or storage of product). Tanks that are going to be used after closure for product storage, storage of a different hazardous waste, or to be dismantled for scrap metal all require decontamination. Tanks that are to be dismantled and disposed of as hazardous waste may not require decontamination, but are subject to land disposal restrictions (40 CFR 268).

Tanks that will be used for accumulation (not to exceed ninety days) of the same hazardous waste following closure should be drained, all visible contamination removed, and inspected. Owners and operators of existing tank systems that will be used for accumulation of hazardous waste should be aware of the assessment requirements of 40 CFR 262 and 265.191.

Decontamination of tanks and appurtenances should include:

- draining the waste and removing the bottom sludges;
- removing all visible contamination by scraping or other mechanical means;
- low volume, high pressure washing; and
- triple rinsing.

Underground tanks containing ignitable waste should be removed in accordance with State Fire Marshall regulations and underlying soil should be sampled for hazardous waste constituents that were in the tank. Tanks containing non-ignitable hazardous waste may be abandoned in place if the tank is properly decontaminated, filled and capped, and soil testing verifies that there was no soil contamination. Soil sampling requirements are discussed in Section 14a of this document.

Sampling and analysis of the final rinse is required, in order to confirm that the cleanup levels have been met, for tanks that are to be used after closure for storage of a product or of a different hazardous waste. At least two samples of the final rinse should be analyzed for the hazardous constituents or hazardous waste constituents identified in the waste. Section 13 describes the cleanup levels for the rinsate minimally expected by the IDEM to achieve clean closure. Decontamination procedures will be repeated until the cleanup levels are met.

Care should be taken to prevent migration of cleaning liquids from the containment area. All washwaters and rinse waters should be collected and managed as hazardous waste until characterization analysis determines them to be non-hazardous. Provide a description of how waste material (rinse water, decontamination equipment, personnel protective equipment, and other materials) from decontamination will be managed. An estimate of the volume of waste material to be generated should also be provided. Please note that residues from listed hazardous waste must be managed as a hazardous waste unless it is delisted under the provisions of 40 CFR 260.22 or is covered by the exemption of 40 CFR 261.4.

13. CLEANUP LEVELS

Clean closure of a storage unit requires removal, remediation, or decontamination of all hazardous waste, hazardous waste constituents, hazardous constituents, leachate, contaminated run-on and run-off, waste decomposition products, liners, and contaminated soils and/or groundwater that pose a substantial present or potential threat to human health or the environment (40 CFR 264.111, 264.114, 265.111 and 265.114).

The IDEM minimally expects the facility to use the following cleanup levels:

Cleanup levels for final rinsates from decontamination procedures are the Maximum Contaminant Levels (MCLs) of the National Primary Drinking Water Regulations (40 CFR 141) and 40 CFR 264.94(a)(2)) for inorganic and certain organic parameters with MCLs, and practical quantitation limits (PQLs), as defined by SW-846, for the organic parameters without MCLs.

Cleanup levels for soils are the practical quantitation limits (PQLs) for organics and background levels for inorganics. Background levels for inorganics are calculated to be the mean plus three standard deviations for each parameter and each depth interval (see Section 14a for background sampling).

Cleanup levels for groundwater are listed in 40 CFR 264.94(a)(2). For those contaminants not found in 40 CFR 264.94(a)(2), the MCLs in 40 CFR 141 should be used, or background levels for each constituent as specified in the Permit, if applicable.

The owner/operator has the option, after determining that these cleanup levels for soils and/or groundwater cannot be feasibly met, to propose alternative levels based on a complete, site-specific, health-based risk assessment. An alternate cleanup level proposal must document that the contaminants left in the soil will not adversely impact any environmental media (groundwater, surface water, or atmosphere), and that direct contact through dermal exposure, inhalation, or ingestion will not result in a threat to human health or the environment. Owners/operators should refer to 52 FR 8706 (March 19, 1987) for demonstration references for cleanup level proposal. Current toxicity information for hazardous constituents can be obtained from the following EPA offices:

Environmental Criteria and Assessment Office
Cincinnati, Ohio
(513) 569-7595

Office of Health and Environmental Assessment
Washington, D.C.
(202) 382-7315

14. SAMPLING AND ANALYSIS PLAN

a. SOIL SAMPLING REQUIREMENTS

Closures of units where there is any evidence or possibility of a leak or spill, or a potential for hazardous waste or hazardous waste constituent (40 CFR 261 Appendix VIII) migration must include investigative sampling of the soil to determine the nature and extent of contamination. Investigative soil sampling must also be provided for container or tank storage areas that are found on soil.

gravel, or paved pads that contain cracks, gaps, or unsealed joints, that are not watertight, or do not have curbs or other forms of secondary containment. Sampling should be performed in accordance with the sampling methods listed in 40 CFR 261, Appendix I or SW-846, Chapter Nine.

In the event of soil contamination, groundwater monitoring may also be required through the closure plan, post-closure care plan, corrective action order, or corrective action provisions of a Part B Permit, if applicable. If the unit is already subject to groundwater monitoring requirements, the location, frequency, or parameters for groundwater sampling may also be modified or extended beyond closure, even if the facility clean closes. Clean closure cannot be achieved if groundwater contamination is present above the limits as described in Section 13.

An adequate investigative soil sampling plan should include the following:

- a. Parameters to be analyzed;
- b. investigative borings (locations and depth intervals to be sampled);
- c. background borings for inorganic parameters (location and depth intervals to be sampled);
- d. boring methods, sampling methods, and equipment;
- e. procedures and/or equipment used to minimize volatilization of samples for organic analysis;
- f. decontamination procedures for the equipment;
- g. statement indicating the clean closure levels (see Section 13); and
- h. A copy of the form that will be used to record and document field soil descriptions and sampling information. At a minimum, the form should record the following information:

Facility/unit;
purpose of sampling event;
date and time;
weather conditions;
field personnel;
soil sampling method and equipment;
boring/test pit location and I.D.;
soil name¹;
sample number(s);
sample interval and depth(s);
USDA soil textural classification²;
lithology;
Munsell soil color³;
sedimentologic features;
miscellaneous observations; and
evidence of contamination (e.g., discoloration, odor, etc.).

¹ Soil mapping unit determined from the appropriate County Soil Survey, published by the United States Department of Agriculture, Soil Conservation Service.

² Soil Survey Staff, 1951 (reissued 1962). Soil Survey Manual, United States Department of Agriculture, Handbook No. 18, U.S. Government Printing Office, Washington, D.C., 503 p.

³ Munsell Soil Color Charts. Munsell Color, Baltimore, MD., 1975.

Note: Facilities are strongly advised to perform continuous soil borings and descriptions according to IDEM Unconsolidated Descriptive Requirements.

Parameters for soil analysis should include elements or compounds of the hazardous waste, hazardous constituents (40 CFR 261 Appendix VIII), or hazardous waste constituents (as defined in 40 CFR 260.10). Parameters may be proposed by the Owner/Operator or the IDEM. Parameters should not only be based on knowledge of the waste managed at the unit but should also include other potential elements or compounds used at the facility that generated the waste. This is similar to considerations applied by the U. S. EPA for waste delistings. For example, soil underlying a surface impoundment containing F006, electroplating wastewater treatment sludge, might also be analyzed for 1,1,1-trichloroethane, a solvent likely to be used at a plating facility. The IDEM may require additional parameters for analysis such as breakdown products.

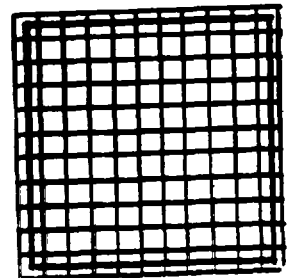
Locations of investigative soil borings and samples should be selected to determine with a high level of confidence whether contamination of any constituents specified previously is present. Random sampling should be performed in a grid system. Directed sampling should be performed at areas of suspected contamination such as cracked areas of a containment structure, areas of known spills, or suspected down slope, downwind, or runoff areas of a containment structure. Other directed or stratified (i.e., sampling at uniform intervals) methods of sampling may be used if warranted on a site specific basis. These methods may include a circular pattern of sampling around a central point or linear sampling along a drainage way, boundary, or perimeter of a container storage area. Grid sampling and directed sampling may both be used in the same closure plan.

For grid sampling, a grid is established that slightly overlaps the unit to be sampled. The grid should not be limited to the boundaries of the unit unless sampling would be obstructed by a building or other barriers. A maximum grid interval length of ten feet should be used for most sites. The number of sample borings to minimally characterize the site for an investigative determination of soil contamination is the cube root of the total number of grid intersection points (an example is shown below). The minimum number of borings required is three. The grid interval or number of sample borings may be modified upon approval if site-specific conditions warrant such changes.

EXAMPLE

The storage pad dimensions are 100 ft. by 100 ft.
The grid interval is 10 ft.
The grid overlaps pad by five feet on each side
There are 144 grid intersections

The number of borings = cube root (144) = 5.2 or 5



Units or sample areas that are irregular in shape should have a grid developed to completely overlap the entire area. Whenever random sampling with a grid system is chosen, the minimum number of borings must be approved. The grid intersections must be numbered and a random number generator or random

number table should be utilized to determine the grid points to be sampled. The borings are to be performed at the grid intersection unless otherwise specified in the sampling plan. The proposed investigative boring locations must be provided and should be included on a detailed drawing of the unit.

The interval for sampling soil at various depths may be dependent on several factors, including:

- soil type and hydraulic conductivity;
- suspected magnitude of surface contamination;
- physical state of the waste and its mobility;
- depth of the water table or first aquifer encountered; and
- length of time that waste was present at the site.

Investigative soil samples should be taken at intervals of every six inches to a depth of two feet, every foot from two to five feet, and two to five foot intervals below five feet. The facility should initially sample and analyze to at least five feet in depth to check for stratification of contaminants.

If contamination above the cleanup levels (see Section 13) is discovered during the investigative soil sampling event, a soil sampling plan that will determine the complete horizontal and vertical extent of contamination will be required. This plan shall be submitted as a proposed modification of the approved closure plan.

Depending on the results of the investigative soil sampling plan, the original investigative borings may require additional sampling to greater depths. Verification of the vertical extent of contamination is determined when two consecutive soil samples meet the cleanup levels. Additional borings may be required to determine the horizontal extent of contamination by sequential placement of additional borings radially from the contaminated borings. Verification of the horizontal extent of contamination is determined by soil borings that meet the cleanup levels in every lateral direction.

After consideration of the extent of contamination, as well as the feasibility of possible remediation alternatives, either a complete remediation plan or a complete health-based risk assessment will be required to be submitted for review. These plans shall be submitted as proposed modifications to the approved closure plan.

For other than above ground tank system closures, angled soil borings should be performed with samples taken at the sides and below the bottom of the tank, and as close to the tank as possible. Additional borings should be located and oriented to allow sampling beneath the tank system. The facility should sample at least two one-foot sample intervals below the bottom of the tank. However, if the tank is removed, only soil verification samples will be required unless contamination is found above cleanup levels.

Background Sampling

Background concentrations are to be determined to account for natural occurrences and variability with each distinctive soil horizon. The background concentrations should be established for site specific waste constituents or specific chemicals (used in various processes or facility operations) that naturally occur in soil. Background concentrations will be determined for each soil horizon. The background concentrations found in the soils are used to statistically compare

the natural conditions to the potentially contaminated soils at the unit undergoing closure.

Naturally-occurring background constituents are usually heavy metals. A few toxic organics, such as phenol or formaldehyde may be naturally produced, but their concentrations in soil would typically be very low or near detection limits. The heavy metals of concern are the Toxicity Characteristic (TC) metals: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Constituents such as cyanide may also be naturally occurring.

Background borings should be performed in areas unaffected by past or present hazardous waste operations, by the hazardous waste units, or by the facility itself. Background samples are to be taken in natural, undisturbed soil, when possible, of the same soil horizon and depth of the waste unit undergoing closure. At a minimum, four background borings are to be performed, with composite samples being taken in each soil horizon encountered in each boring. Composite samples should be taken of each entire soil horizon encountered in the boring and the compositing procedure should be described in the sampling plan. This will give a minimum of four samples for each soil horizon.

Soil horizons or soil types present at the affected units must be determined by a professional geologist in accordance with the U.S. Department of Agriculture soil classification and documented in the Closure Certification. If the soil horizons cannot be adequately defined, the facility must establish background concentrations by sampling at the same depth intervals as the investigative borings. When specific depth intervals are sampled, composite sampling is not applicable.

Cleanup levels based on background are calculated as the mean of the four samples' concentrations for each soil horizon plus three standard deviations.

All investigative and background boring locations and sampling intervals should be adequately justified and are subject to approval and/or modification. The proposed background boring location must be provided and should be included on a detailed map or diagram of the facility. Any deviations from the sampling plan, due to problems encountered in the soil or due to knowledge of the area, should be adequately justified and will be subject to review. The background soil sample results may also be subject to approval if the concentrations are not typical of local Indiana soils.

Sampling Quality Assurance

Sampling methods and equipment should follow guidance in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846) (see 40 CFR 260.11). Field sampling methods not included in SW-846 or in 40 CFR 261 Appendix I, must be approved by the IDEM before they are used in the closure. This includes methods such as drilling, boring, and other sampling methods. When available, standard procedures as defined by the U. S. EPA, the IDEM, or ASTM should be followed.

For each sample batch (20 samples or less), at least one field duplicate per matrix type must be collected. When samples are collected for volatile organic analysis, a trip blank is also required for each day that samples are collected. In addition, for each batch, sufficient sample amounts must be collected for at least one sample per matrix type to allow the laboratory to prepare one matrix

spike and either one matrix duplicate or one matrix spike duplicate per analytical batch when appropriate for the method. Blanks, however, should not be spiked. Additional control samples, such as equipment blanks, may be necessary in order to assure data quality that meets the sampling objectives.

The sampling plan should also describe the sampling equipment, sample containers, sample preservatives, and chain-of-custody procedures. A detailed description of the equipment decontamination procedures should also be provided.

Soil samples for volatile organics analysis require specialized sampling and handling procedures. Samples should be taken with a sampler that uses a split spoon or removable liners made of stainless steel or some other material acceptable to the laboratory. As an alternative, the soil sample can be taken by driving a stainless steel tube into the ground. Preparation, decontamination, and sampling should be performed in accordance with SW-846. Under no circumstances should soil samples for volatile organic analysis be mixed, composited, or otherwise aerated.

The following publications provide information on field sampling programs:

"Environmental Sampling for Hazardous Waste", Schweitzer, G. E. and J. A. Santolucito (eds.), 1984, ACS Symposium Series No. 267, American Chemical Society, Washington D.C.

"Statistical Methods for Environmental Pollution Monitoring" Richard O. Gilbert, 1987, Van Nostrand Reinhold Company, Inc., New York, New York.

b. ANALYTICAL REQUIREMENTS

The Closure Plan should include a complete Quality Assurance Project Plan (QAPP) for the sampling and analytical requirements. Guidelines for developing a QAPP and its sixteen elements are found in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846), Chapter One. The QAPP describes the data quality objectives (DQOs), sample custody procedures, analytical quality control criteria, and the corrective actions taken if these criteria are not met. The DQO for the sampling and analysis specifies the acceptable level of uncertainty in the results and the quality of the data required to achieve that acceptable level.

The Closure Plan should also specify the analytical methods for each parameter, the sample preparation/extraction methods, and the estimated practical quantitation limits (PQLs) for each analyte. Guidance for establishing PQLs, which are highly matrix-dependent, is provided in SW-846. The analytical methods from SW-846 should be used whenever possible. Other official EPA methods applicable for the sample matrix may be used; but any modification to these methods or the use of any other methods will require the submittal of the complete method for approval by the IDEM. The Quality Assurance requirements in the individual methods must be performed by the laboratory to produce acceptable quality data.

Commonly used field screening instruments, such as Combustible Gas Indicators, Colorimetric Indicator Tubes, and Photoionization Detectors (i.e., HNU's and TIPs) are not acceptable substitutes for SW-846 methods. These screening

methods may be used to suggest the presence, but not the absence, of hazardous constituents. If portable field instruments are used, their results should be confirmed by SW-846 methods.

Closure Certifications or Closure Status Reports which contain analytical results must include the following information to allow the IDEM to review and validate the data:

- a. Summary report of results;
- b. Sampling, preparation, and analysis dates;
- c. Analytical and preparation methods used;
- d. Practical quantitation limits (detection limits for non-SW-846 methods);
- e. Sample, duplicate sample, and blank results;
- f. Calibration results (whichever is applicable);
 1. calibration curves,
 2. correlation coefficients,
 3. continuing calibration verification,
 4. linear range report (for ICP analyses),
 5. response factors and percent relative standard deviations (for GC and GC/MS),
 6. calibration check compounds and system performance check compounds results (for GC/MS);
- g. Standard Addition method results (if applicable);
- h. Laboratory Control Sample results;
- i. Matrix spike/matrix spike duplicate results;
- j. BFB or DFTPP tuning criteria results (for GC/MS);
- k. Surrogate recoveries (for GC and GC/MS); and
- l. Signed Chain-of-custody sheets for all samples.

15. DESCRIPTION OF SOIL REMEDIATION ACTIVITIES

Any facility that is attempting to "clean" close must fully describe each step taken in removing waste and contaminated soil from the unit and surrounding areas. Other forms of remediating contaminated soil must be described in order to meet the cleanup levels.

The plan should include a description of solidification/ stabilization, accumulation of waste or reagents, equipment, soil removal pattern and excavation depth increments, loading areas, or any other steps critical to soil removal. The plan should clearly define how soil will be removed, accumulated, loaded, and managed once the soil leaves the site. Roll-off containers are recommended for accumulation and removal of hazardous wastes. Please also include a description of any backfill material used.

Alternatively, soil containing certain hazardous waste constituents may be remediated to cleanup levels and allowed to remain in the unit or be placed back into the unit. Bioremediation and soil vapor extraction of organic constituents are examples of remediation processes. A complete remediation plan will be required to be submitted for review as a proposed modification to the approved closure plan.

The remediation plan shall include:

- a detailed description of the treatment process;
- justification of applicability and feasibility of this process to this site (including discussion of site conditions and contaminants);

- schedule of activities;
- expected time frame to meet the cleanup levels;
- periodic testing to verify progress;
- periodic status reports indicating progress made;
- sampling (locations and depths) and analysis procedures for periodic and final verification; and
- final verification sampling and analysis to confirm complete remediation to cleanup levels.

In addition, efforts to minimize air emissions, including volatiles and dust, should be described when applicable.

16. DISPOSAL UNIT CLOSURES

Any unit where waste is to be left in place (i.e., landfills, tanks unable to clean close, waste piles, and surface impoundments to be closed as landfills) has several additional important considerations beyond that required for a "clean" closure. The considerations include liners, final cap cover, vegetation, ground water monitoring, post-closure care, and permit requirements.

Full descriptions and detailed engineering drawings will be required for each unit undergoing closure. Details of liners, drainage layers, covers, vegetation, wells, final contours, construction quality assurance, or any relevant structures or practices should be provided.

Note several additional regulatory requirements for closed disposal units exist in 40 CFR 265.197, 265.228, 265.280, and 265.310 for interim status facilities and 40 CFR 264.197, 264.228, 264.280, and 264.310 for permitted facilities. The requirements concern groundwater monitoring, post-closure plans, post-closure care, notice to local land authority, and notice in deed to property. Refer to 40 CFR 264 Subpart F and 265 Subpart F for groundwater monitoring requirements and Sections 25 and 26 of this document for post-closure care and notices.

17. DESCRIPTION OF EQUIPMENT CLEANING

Any equipment, including heavy earth-movers or small tools, should be scraped and washed to remove waste residues. These residues should be managed as hazardous waste and the procedure of their cleaning and management should be described in detail in the closure plan.

18. CLOSURE AND POST-CLOSURE COST ESTIMATES/FINANCIAL ASSURANCE

Provide a closure cost estimate, calculated to cover the cost in current dollars, of closure in accordance with 329 IAC 3.1-14-3 or 329 IAC 3.1-15-3. Closure costs should, at a minimum, include estimates for removal of inventory, decontamination, sampling and analysis, and certification of closure. The costs should be based on a third party closing the facility. Closure costs should also include a contingency fee based on a percent of total costs to compensate for errors of omission or unforeseeable circumstances. For facilities which require post-closure, a separate post-closure cost estimate must also be provided in accordance with 329 IAC 3.1-14-13 and 329 IAC 3.1-15-5.

Financial assurance must be established for closure and post-closure based on the closure and post-closure cost estimates. Several options are available under 329 IAC 3.1-14 and 329 IAC 3.1-15 for establishing the appropriate financial mechanism.

CLOSURE ACTIVITIES

See Attachment 2 for a flow chart which provides an explanation of the Closure Activities Process.

19. REQUEST FOR ADMINISTRATIVE REVIEW

If the owner/operator wishes to challenge a modified closure plan, a Petition for Administrative Review and a Petition for a Stay of Effectiveness must be filed with the Technical Secretary of the Solid Waste Management Board within fifteen days of the date of receipt of the approved closure plan. The petition must include facts demonstrating that one is either the applicant, a person aggrieved or adversely affected by the decision, or likewise entitled to review by law. The petition must specifically identify those portions or conditions of the modified closure plan for which a stay and/or administrative review is being requested. For further information, please refer to Indiana Code 13-7-10-2.5 and 4-21.5-3.

20. TIME EXTENSIONS DURING THE CLOSURE PERIOD

Under 40 CFR 264.113 and 265.113, the Commissioner may approve an extension of the one hundred eighty day closure period if the owner/operator can demonstrate, among other things, that:

- a. closure activities will necessarily take them longer than one hundred eighty days to complete, and
- b. the owner/operator has taken and will continue to take all steps to prevent threats to human health and the environment from the unclosed, but inactive facility.

For closures under the interim status requirements, 40 CFR 265.113 (b) and (c) states that an extension of the one hundred eighty day closure period must be requested at least thirty days prior to the expiration of the one hundred eighty day period. Justification for the time extension must be provided. For permitted facilities undergoing closure, 40 CFR 264.113(d) requires that the permit be modified in accordance with 40 CFR 270.42.

As previously noted, a closure time period for achieving clean closure should not exceed three years. If clean closure cannot be achieved, a post-closure plan must be submitted for approval.

CLOSURE CERTIFICATION PROCEDURES

21. SUBMITTAL OF CLOSURE PLAN AND CERTIFICATIONS

The owner/operator of the facility should submit all copies of the closure plan, certification, and any revisions (one with original signatures) to:

Section Chief
Plan Review and Permit Section
Office of Solid and Hazardous Waste Management
Indiana Department of Environmental Management
100 North Senate Avenue
P. O. Box 6015
Indianapolis, Indiana 46206-6015

22. SIGNATURE REQUIREMENTS

The closure plan application, revisions, and reports are subject to the signatory requirements of 40 CFR 270.11. The application must be signed as follows:

- a. For a corporation, by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:
 1. A president, vice president, treasurer, or secretary of the corporation in charge of a principal business function, or any other person that performs similar policy or decision making function for the corporation; or
 2. The manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding \$25 million if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
- b. For a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or
- c. For a municipality, state, federal, or other public agency by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a federal agency includes:
 1. The chief executive officer of the agency, or
 2. A senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (for example, Regional Administrators of the U. S. EPA).

A duly authorized representative may also sign the application, but a written authorization must be signed by the appropriate officer as defined above, and the authorization must be on file with the IDEM.

The closure plan certification statement (Attachment 3) should be used. At least one of the copies of the certification must have original signatures.

Certification of closure constitutes a report as defined by 40 CFR 270.11(b), and therefore must conform to the associated signatory requirements. The certification must be signed by the officer described in this section, as well as the registered professional engineer.

23. CERTIFICATION OF CLOSURE

All partial or total closures of hazardous waste management units must be certified by both the owner/operator and an independent registered professional engineer in accordance with 40 CFR 264.115 and 265.115. Certification is due 60 days after completion of closure activities, and no more than 240 days from the date of closure plan approval (unless otherwise approved).

The independent engineer should be present at all critical, major activities during the closure. These activities may include soil sampling, remediation, final cover placement, and other events. The frequency of inspections by the independent engineer should be sufficient to determine the adequacy of each critical activity. The responsibilities of the certifying engineer during closure are discussed in the preamble of the May 2, 1986 Federal Register amending the closure and post-closure requirements of 40 CFR Parts 264 and 265.

The independent engineer or the facility owner/operator may be required to notify the IDEM in advance of any critical closure activity.

A closure documentation report should be submitted with the certification statement. This report should include, but not be limited to the following:

- a. The volume or weight of waste and waste residue removed;
- b. the method of waste handling and transport;
- c. waste manifest numbers or copies of manifests from removal of waste and waste residues;
- d. the sampling and analytical methods used;
- e. a chronological summary of closure activities;
- f. closure costs;
- g. photo documentation of closure; and
- h. analytical results.

All analytical results must include the information listed in Section 14b of this document, in order to be validated by the IDEM.

A revised cost estimate and financial assurance instruments should be submitted with the closure certification documents for partial closures. If this is a total closure, the certification documents should include a request for release from financial assurance.

A certification identical to the one in Attachment 4 should be included with the certification of closure.

24. STATUS OF FACILITY AFTER CLOSURE

The closure plan and closure certification should clearly state the status of the hazardous waste facility after closure is completed. For example, the plan and certification should state if a storage facility is to be operated as a generator (less than ninety (90) day accumulation). The plan should describe whether closure is partial or total. If the

closure is partial, the plan and/or certification should name both the units covered by the closure plan or certification as well as those units remaining in operation or covered by the permit. The plan and/or certification should indicate whether the facility will continue to be permitted, or the facility status would be changed to a generator and/or transporter (if applicable).

Indicate which of the following categories describes the intended use of the facility:

- a. The facility will continue to be permitted.
- b. No treatment, storage, or disposal will occur at the facility.
- c. The facility will continue to treat or store hazardous wastes under interim status requirements.
- d. The facility will be a small quantity generator of less than 1,000 kg/month of hazardous waste and the hazardous waste will be accumulated for less than ninety (90) days.
- e. The facility will be a generator of more than 1,000 kg/month and will accumulate the hazardous waste for less than ninety (90) days.
- f. The facility will generate more than 100 kg/month, but less than 1,000 kg/month, and accumulate the hazardous waste for less than 180 days (270 days if applicable).
- g. The facility will be exempt from treatment, storage, and disposal (TSD) regulation under RCRA.
- h. The facility will be a transporter of hazardous waste.

25. PART A MODIFICATION AND WITHDRAWALS

The following section applies only to facilities with permits or interim status. Facilities that are required to close by an enforcement action or other means, and did not have interim status, may skip this section.

The owner/operator must revise the Part A Permit Application in accordance with 40 CFR 270.71 when closure certification is submitted. Although responsibility for a closed unit cannot be terminated completely with closure, in the case of a total closure which requires no post-closure care, the owner/operator should submit a letter requesting withdrawal of the Part A Permit Application to the IDEM with their closure certification.

In the case of a partial closure, the owner/operator must submit a revised Part A Permit Application that includes only the remaining units, and if necessary, a corrected copy of the existing Part A. A cover letter referencing the closure and explaining the change should also be included. Permitted facilities should modify their permit according to 40 CFR 270.42.

26. POST-CLOSURE CARE

The closure plan for any disposal unit must include a post-closure care plan in accordance with 40 CFR 265.117. Land disposal units that close after May 19, 1981 are obligated to submit an application for a Post-Closure Care Permit upon request from the IDEM.

Tank systems which do not have secondary containment must follow the procedures for post-closure care outlined in 40 CFR 265.197.

27. LOCATION DOCUMENTATION FOR DISPOSAL UNITS

There are three notification requirements for facilities which close units in-place with post-closure care.

First, 40 CFR 265.116 states that at no later than the submission of the certification of closure of each hazardous waste disposal unit, an owner or operator must submit to the local zoning authority or county land use authority, and the Commissioner, a survey plat indicating the location and dimension of landfill cells or other hazardous waste disposal units with respect to permanently surveyed benchmarks. This plat must contain a note indicating the owner's or operator's obligation to restrict disturbance of the hazardous waste disposal unit in accordance with 40 CFR Part 265, subpart G regulations.

Note: A copy of the survey plan and a copy of the document with notation required by 40 CFR 254.116 must be provided to the Commissioner with the closure certification.

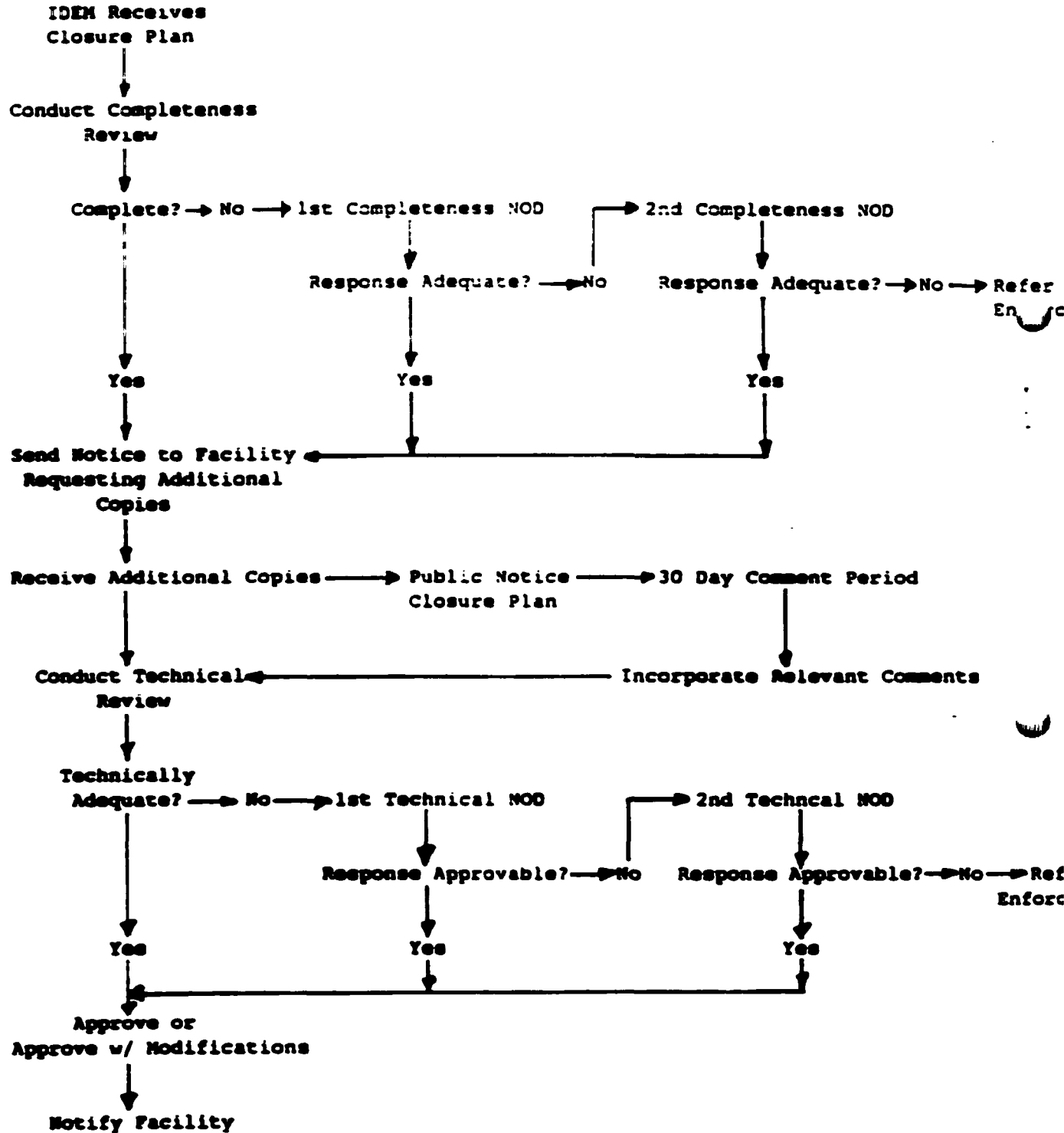
Second, 40 CFR Part 265.119(a) states that within 60 days of certification of each hazardous waste disposal unit, the owner or operator must submit to the zoning authority or county land use authority, and the Commissioner, a record of the type, location, and amount of hazardous wastes disposed of within each cell.

Third, 40 CFR Part 265.119(b) states that within sixty (60) days of certification of closure of the first and last hazardous waste disposal unit, the owner or operator must:

- a. Record a notice in deed that the land was used to manage hazardous waste, and must not be disturbed; and
- b. Certify that this information was recorded, and a copy was sent to the Commissioner.

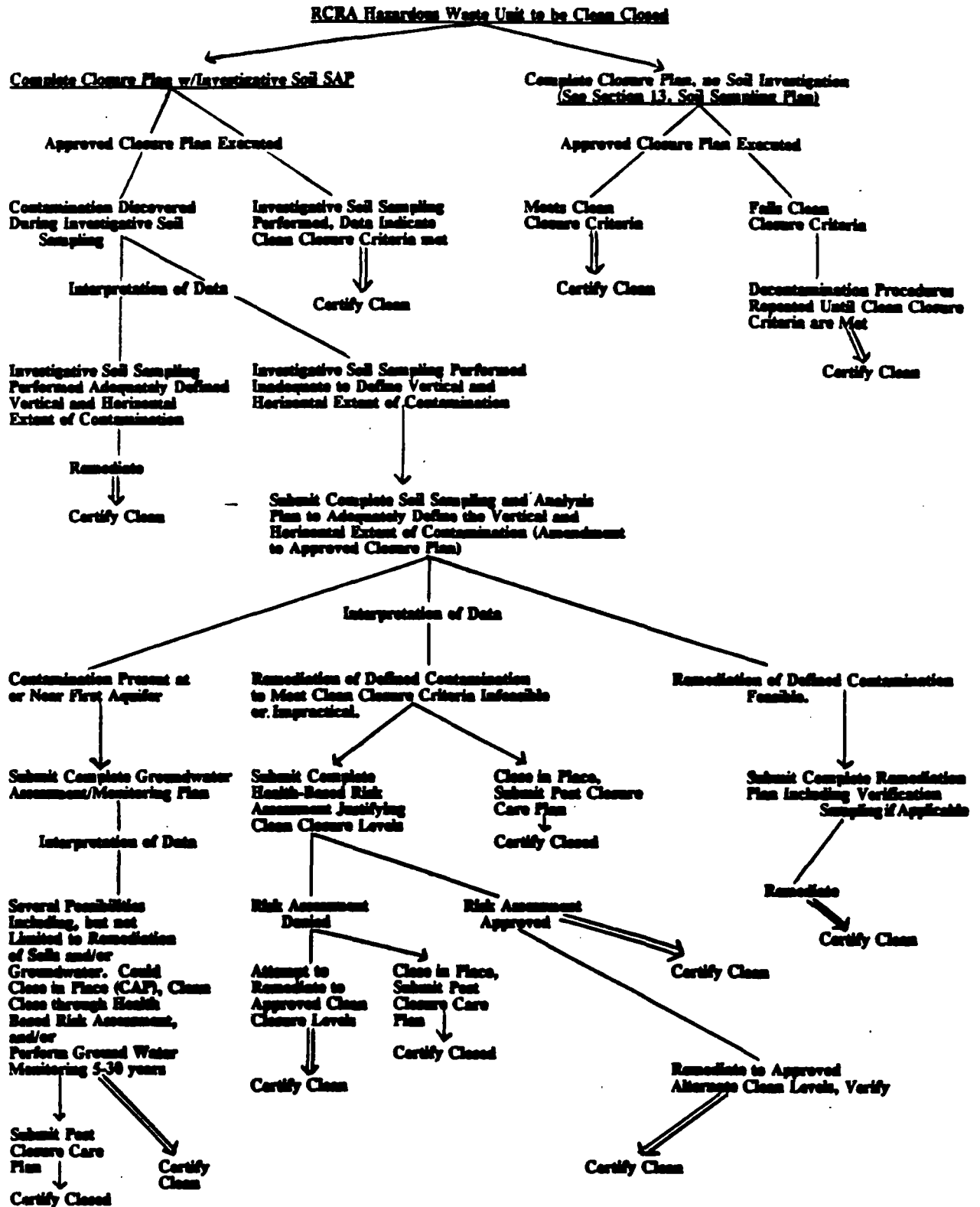
ATTACHMENT 1

CLOSURE PLAN REVIEW PROCESS



Attachment 2

Closure Activities Process



• Arrowed Steps Require IDEM Approval

ATTACHMENT 3

CLOSURE PLAN CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

U. S. EPA I. D. Number

Facility Name

Signature of Owner/Operator

Name and Title

Date

ATTACHMENT 4

CLOSURE CERTIFICATION STATEMENT

The hazardous waste management unit(s) at the facility described in the closure plan has (have) been closed in accordance with the specifications in the approved closure plan. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons that manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

U. S. EPA I. D. Number

Facility Name

Signature of Owner/Operator

Name and Title

Signature of Registered P.E.

Name of P.E. and Registration
Number

Date

ATTACHMENT 5

REFERENCES FOR ADDITIONAL INFORMATION

1. 40 CFR Parts 190 to 399, U. S. Government Printing Office.
2. 329 IAC 3.1, Hazardous Waste Management Permit Program and Related Hazardous Waste Management.
3. Closure of Hazardous Waste Surface Impoundments, 1982 (EPA/SW-873) or (NTIS-PB87-155 537/AS).
4. Closure/Post-Closure and Financial Responsibility Requirements for Hazardous Waste Treatment, Storage, and Disposal Facilities; Final Rule; Background Document, 1986 (EPA/530-SW-86-009) or (NTIS-PB86-210 671).
5. Closure/Post-Closure Interim Status Standards (40 CFR 265, Subpart G): Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities under RCRA, Subtitle C, Section 3004, 1984 (EPA/SW-912) or (NTIS-PB87-156 683/AS).
6. Final Draft Guidance for Subpart G of the Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, 1981 (NTIS-PB87-193 397).
7. Financial Assurance for Closure and Post-Closure Care; Requirements for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities; A Guidance Manual, 1982 (EPA/SW-955) or (NTIS-PB82-237 595).
8. Guidance Manual for Cost Estimates for Closure and Post-Closure Plans (Subparts G and H); Volume I: Treatment and Storage Facilities; Volume II: Land Disposal Facilities; Volume III: Unit Costs; Volume IV: Documentation; 1986 (EPA/530-SW87-009A, B, C, and D).
9. Guidance Manual on Hazardous Waste Land Treatment Closure/Post-Closure, 40 CFR Part 265, 1987 (NTIS-PB87-183 695).
10. Interim Status Standards and General Status Standards for Closure and Post-Closure Care (40 CFR 264 and 265, Subpart G); Standards Applicable Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities Under RCRA, Subtitle C, Section 3004, 1980 (NTIS-PB81-189 763).
11. National Criteria for a Quality Hazardous Waste Management Program, 1986 (EPA/530-SW-89-011).
12. RCRA Ground Water Monitoring Technical Enforcement Guidance Document (TEGD) (Final), 1986 (EPA/530-SW-86-055) or (NTIS-PB87-107 751/AS).
13. RCRA Guidance Manual for Subpart G Closure and Post-Closure Care Standards and Subpart H Cost Estimating Requirements, 1987 (EPA/530-SW-87-010) or (NTIS-PB87-158 978/AS).
14. Surface Impoundment Clean Closure Guidance Manual, 1987 (EPA/530-SW-87-022) OSWER Directive 9476.00-8.C.

15. **Technical Resource Document for the Storage and Treatment of Hazardous Waste in Tank Systems, 1986 (EPA/530-SW-86-044) or (NTIS-PB87-134 391/AS).**
16. **Test Methods for Evaluating Solid Waste: Physical/Chemical Methods; Third Edition, Volumes IA, IB, IC, and II, 1986 (EPA/SW-846) or (NTIS-PB88-239 223).**
17. **National Fire Prevention Association, NFPA 30 Flammable and Combustible Liquids Code.**
18. **Technical Guidance Document: Construction Quality Assurance for Hazardous Waste Land Disposal Facilities, 1986 (EPA/530-SW-86-031)**

Most of these documents are available through the RCRA Hotline: (800) 424-9346 or (800) 553-7672 - TDD (for hearing impaired).

This is not a comprehensive list of all documents available.